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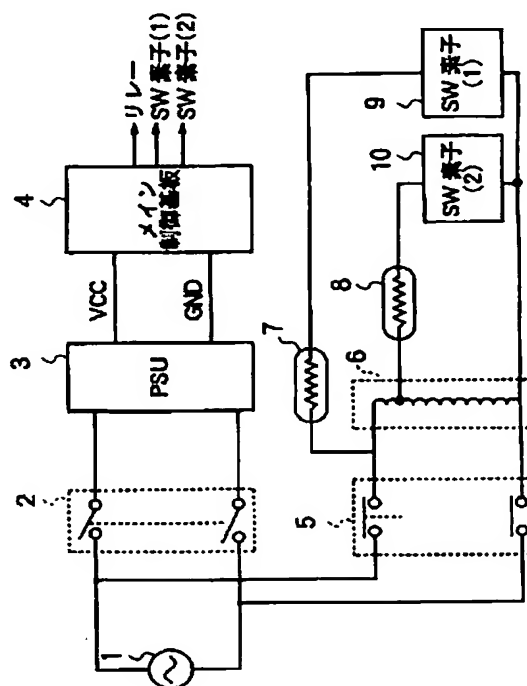
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(54) 【発明の名称】 定着ヒータ・露光光源制御装置

(57) 【要約】

【課題】 必要最小限に突入電流を抑え、これにより電圧変動規格を満足できる定着ヒータ・露光光源制御装置を提供する。

【解決手段】 印加電圧の異なる複数の定着ヒータ7, 8を用いし、画像形成装置の各状態に応じて点灯する定着ヒータ7, 8をメイン制御基板4により使い分けることで、突入電流を抑え、電圧変動規格を満足する。



【特許請求の範囲】

【請求項 1】 商用交流電源から商用交流電圧が印加される複数の定着ヒータと、印加された商用交流電圧を降下させるためのトランスと、定着ヒータをオン、オフ制御する制御手段とを持つ複写機等の定着ヒータ制御装置において、

前記複数の定着ヒータは、印加電圧の異なる定着ヒータであることを特徴とする定着ヒータ制御装置。

【請求項 2】 前記印加電圧の異なる定着ヒータの容量は、印加電圧の高い定着ヒータよりも、印加電圧の低い定着ヒータの方が小さいことを特徴とする請求項 1 記載の定着ヒータ制御装置。

【請求項 3】 機械待機時には印加電圧の低い定着ヒータで点灯制御し、機械動作時は印加電圧の高い定着ヒータで点灯制御することを特徴とする請求項 2 記載の定着ヒータ制御装置。

【請求項 4】 機械動作時に、印加電圧の高い定着ヒータを点灯するときは、先に印加電圧の低い定着ヒータを一定時間点灯させてから、印加電圧の低い定着ヒータとは入れ替えに印加電圧の高い定着ヒータの点灯制御を開始することを特徴とする請求項 3 記載の定着ヒータ制御装置。

【請求項 5】 印加電圧の高い定着ヒータと、印加電圧の低い定着ヒータとを両方点灯するときは、点灯スタートタイミングをずらすように制御することを特徴とする請求項 2 記載の定着ヒータ制御装置。

【請求項 6】 2つの定着ヒータの点灯スタートタイミングをずらすように制御するために、印加電圧の高い定着ヒータと印加電圧の低い定着ヒータの点灯信号を、電源周期の $1/2$ サイクル以上ずらして制御することを特徴とする請求項 5 記載の定着ヒータ制御装置。

【請求項 7】 先に点灯スタートする定着ヒータが、印加電圧の低い定着ヒータであることを特徴とする請求項 6 記載の定着ヒータ制御装置。

【請求項 8】 商用交流電源から商用交流電圧が印加される複数の露光光源と、印加された商用交流電圧を降下させるためのトランスと、露光光源をオン、オフ制御する制御手段とを持つ複写機等の露光光源制御装置において、

前記複数の露光光源は、印加電圧の異なる露光光源であることを特徴とする露光光源制御装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、画像形成装置の定着ヒータ・露光光源制御装置に関する。

【0002】

【従来の技術】 近年、欧州では CE マークに伴い、電圧変動、高調波等の規格が制定されつつある。従来の画像形成装置では、定着用ハロゲンランプや露光用ハロゲンランプのように、交流電圧にて点灯制御しているワット

数の大きいハロゲンランプに対しては、ハロゲンランプのオン時とオフ時とで、画像形成装置全体の電流変動が大きくなるため、上記電圧変動規格を満足することは困難であった。

【0003】 また、ハロゲンランプは、電圧を印加した瞬間にハロゲンランプの定格電流の $10 \sim 15$ 倍の突入電流が流れるため、従来の画像形成装置では、この突入電流を抑えるために、ハロゲンランプオンからある一定時間位相制御を行うソフトスタートを実施したり（例えば、特開平 5-224559 号公報）、ハロゲンランプの定格電圧より小さい電圧で予備点灯したり（例えば、特開平 6-110565 号公報）、電流制限抵抗を挿入するなどの対策を行っていた。

【0004】

【発明が解決しようとする課題】 しかし、上記対策では以下のような不具合があった。

(1) ソフトスタートのような位相制御を行うと、高調波ノイズが発生する。

(2) ハロゲンランプを定格電圧より小さい電圧で点灯すると、ハロゲンランプのフィラメント温度（色温度）が低くなり、相対的に濃い濃度のハロゲンガスとなり、フィラメントは浸食されて、ハロゲンランプの寿命が短くなる。

(3) 電流制限抵抗を挿入して、突入電流を $5 \sim 10$ 倍程度に抑えても、電圧変動規格を満足できるような効果はない。

【0005】 本発明は、上記従来技術の欠点を解決し、必要最小限に突入電流を抑え、これにより電圧変動規格を満足できる定着ヒータ・露光光源制御装置を提供することを目的とする。

【0006】

【課題を解決するための手段】 この目的を達成するために、第 1 の手段は、商用交流電源から商用交流電圧が印加される複数の定着ヒータと、印加された商用交流電圧を降下させるためのトランスと、定着ヒータをオン、オフ制御する制御手段とを持つ複写機等の定着ヒータ制御装置において、複数の定着ヒータは、印加電圧の異なる定着ヒータであることを特徴とするものである。

【0007】 また、第 2 の手段は、第 1 の手段において、印加電圧の異なる定着ヒータの容量は、印加電圧の高い定着ヒータよりも、印加電圧の低い定着ヒータの方が小さいことを特徴とするものである。

【0008】 また、第 3 の手段は、第 2 の手段において、機械待機時には印加電圧の低い定着ヒータで点灯制御し、機械動作時は印加電圧の高い定着ヒータで点灯制御することを特徴とするものである。

【0009】 また、第 4 の手段は、第 3 の手段において、機械動作時に、印加電圧の高い定着ヒータを点灯するときは、先に印加電圧の低い定着ヒータを一定時間点灯させてから、印加電圧の低い定着ヒータとは入れ替え

に印加電圧の高い定着ヒータの点灯制御を開始することを特徴とするものである。

【0010】また、第5の手段は、第2の手段において、印加電圧の高い定着ヒータと、印加電圧の低い定着ヒータとを両方点灯するときは、点灯スタートタイミングをずらすように制御することを特徴とするものである。

【0011】また、第6の手段は、第5の手段において、2つの定着ヒータの点灯スタートタイミングをずらすように制御するために、印加電圧の高い定着ヒータと印加電圧の低い定着ヒータの点灯信号を、電源周期の1/2サイクル以上ずらして制御することを特徴とするものである。

【0012】また、第7の手段は、第6の手段において、先に点灯スタートする定着ヒータが、印加電圧の低い定着ヒータであることを特徴とするものである。

【0013】また、第8の手段は、商用交流電源から商用交流電圧が印加される複数の露光光源と、印加された商用交流電圧を降下させるためのトランスと、露光光源をオン、オフ制御する制御手段とを持つ複写機等の露光光源制御装置において、複数の露光光源は、印加電圧の異なる露光光源であることを特徴とするものである。

【0014】

【発明の実施の形態】以下、本発明の実施の形態を添付図面を参照しながら説明する。図1は本発明の一実施の形態を示す定着ヒータ制御装置のブロック図である。本装置は、商用交流電源1に接続されており、メインスイッチ2、PSU（パワーソースユニット）3、メイン制御基板4、リレー5、トランス6、2本の定着ヒータ

(1)7、(2)8、SW素子(1)9、(2)10を図のように結線して構成されている。

【0015】このような構成において、メインスイッチ2がオンされると、PSU3が起動し、メイン制御基板4にDC電源を供給する。メイン制御基板4に電源が供給されると、基板4内のCPU、及びRAM内のプログラム等が起動する。プログラムが起動すると、まずリレー5をオンし、次いでSW素子(1)9、SW素子(2)10をオンし、定着ヒータ(1)7、定着ヒータ(2)8がそれぞれ点灯する。

【0016】ここで、SW素子9、10は、半導体やリレー等が考えられるが、オン、オフが出来れば何でもよい。また定着ヒータ(1)7には、商用交流電源1の電圧が直接印加され、定着ヒータ(2)8には、商用交流電源1の電圧がトランス6を通して、ある電圧に降下されて印加されるように構成されている。定着ヒータ7、8は、サーミスタ等の温度検知素子で定着ローラ表面温度を検知して、定着温度が一定に保てるように制御を行っている。

【0017】ここで、商用交流電源1より供給される電圧をEとして、実際に定着ヒータ(1)7に掛かる電圧

を V_0 、定着ヒータ(2)8に掛かる電圧を V_1 とすると、 V_0 と V_1 の関係は $V_0 > V_1$ となり、このときの各定着ヒータ7、8の突入電流の関係は $I_{P0} > I_{P1}$ となる。

【0018】従って、商用交流電源1より供給される電圧Eの各定着ヒータ点灯時の電圧変動分は ΔE 、 $> \Delta E$ となり、定着ヒータ(2)8の点灯時の方が電圧変動は小さくなる。このように、定着ヒータ7、8に掛かる電圧を下げることで突入電流を抑えて、これにより電圧変動を抑えることができるようになる。

【0019】また上記では、定着ヒータが2本であるが、トランス6の出力を複数に構成して、定着ヒータもトランス6の出力分持てば、より細かい制御も可能になる。

【0020】請求項1記載の発明では、上記図1で説明したように、定着ヒータ(1)7と定着ヒータ(2)8に印加される電圧が異なる〔定着ヒータ(1) > 定着ヒータ(2)〕ように構成してある。このため、機械の各状態に応じて、点灯する定着ヒータを使い分けることで、機械全体に流れる電流を極力抑えるように制御できるようになっている。

【0021】請求項2記載の発明では、定着ヒータ

(1)7と定着ヒータ(2)8に印加される電圧が異なるように構成してあり、かつ定着ヒータ(1)7と定着ヒータ(2)8の容量(ワット数)の関係が、定着ヒータ(1) > 定着ヒータ(2)のように構成してある。このため、定着ヒータ(1)7より定着ヒータ(2)8の点灯時の方が、電流変動を減らすことができるようになっている。

【0022】請求項3記載の発明では、上記で説明した各条件の定着ヒータ(1)7と定着ヒータ(2)8が、機械待機時には定着ヒータ(2)8のみで点灯制御し、機械動作時は定着ヒータ(1)7のみで点灯制御するように構成しているので、機械待機時における電流変動を抑えられるようになっている。

【0023】待機時は動作時に比べ、ヒータの熱が転写紙に取られることがないため、小容量のヒータで済む。また電圧変動を極力抑えるためには、定着ヒータ7、8を点灯し続けるか、あるいは消し続けるように状態の変化を抑えることが必要であり、このため、本発明では小容量の定着ヒータ7、8で長く点灯させるように制御するように構成している。

【0024】請求項4記載の発明では、機械動作時の定着ヒータ(1)7と定着ヒータ(2)8の点灯制御タイミングは、図2に示すようなタイミングになっており、定着ヒータ(1)7を点灯させるときは必ず定着ヒータ(2)8を t_0 時間点灯して、定着ヒータ(1)7を暖めてから定着ヒータ(2)8をオフし、 t_1 時間おいて定着ヒータ(1)7をオンするように制御している。

【0025】ここで、 t_0 は定着ヒータ(1)7のイン

ピーダンスが Z 。〔 Ω 〕になるまでの時間で、ヒータ定格電圧、定格容量によって異なってくる。また、定着ヒータ(1)7のインピーダンスを Z 。〔 Ω 〕に上昇させてから点灯させるのは、定着ヒータ(1)7のオン時の突入電流を防ぐためである。

【0026】また、定着ヒータ(2)8のオフから定着ヒータ(1)7のオンの間に t 、時間あけるのは、定着ヒータ(1)7と定着ヒータ(2)8が同時に点灯することで、機械に定着ヒータ2本分の電流が流れて電流変動が大きくなることを避けるためである。

【0027】上記内容を図3のフローチャートを基に説明すると、機械が動作開始するとまず、定着ローラ表面温度が設定目標値であるかどうか判断し(ステップ301)、目標値以下の場合はSW素子(2)10をオンし、定着ヒータ(2)8を点灯させる(ステップ302)。そして、定着ヒータ(2)8を点灯させている時間が t 。になったかどうかを判断し(ステップ303)、 t 。にならない場合はSW素子(2)10をオンし続け、 t 。になった場合はSW素子(2)10をオフする(ステップ304)。

【0028】次いで、SW素子(2)10をオフしてから t ：時間経過したかどうかを判断し(ステップ305)、 t ：時間経過した場合はSW素子(1)9をオンし、定着ヒータ(1)7を点灯させる(ステップ306)。ここで、定着ヒータ(1)7の点灯中に定着ローラ表面温度が目標温度になったかどうかを判断し(ステップ307)、目標温度にならない場合はSW素子(1)9をオンし続け、目標温度になった場合はSW素子(1)9をオフする(ステップ308)。

【0029】次いで、機械の動作が終了したかどうか判断し(ステップ309)、動作終了の場合は待機状態の制御を行う。まだ機械動作を行っている場合はステップ301に戻り、同様に制御を行う。

【0030】請求項5～7記載の発明では、定着ヒータ(1)7と定着ヒータ(2)8を同時に点灯させるような場合は、図4に示すようなタイミングになっており、定着ヒータ(2)8を点灯してから t 時間後に定着ヒータ(1)7を点灯させるように制御している。

【0031】ここで、 t は定着ヒータ(2)8と定着ヒータ(1)7の点灯開始時の突入電流の重ならないための時間であり、請求項6記載の発明ではこの時間を、商用電源周期の $1/2$ サイクルに制御するようにしている。また、この時間に定着ヒータ(2)8を先に点灯させることで、定着ヒータ(1)7を暖められるので、定着ヒータ(1)7自体の突入電流を抑えることも可能になる。

【0032】ここで、請求項7記載の発明のように、定着ヒータ(2)8を先に点灯させるのは、定着ヒータ(1)7に比べ印加電圧が低く、ヒータ容量も小さく構成させているため、点灯開始時の突入電流を小さく抑え

るためである。

【0033】以上、本発明の実施の形態は電源負荷として定着ヒータを例に挙げて説明したが、露光ランプの場合も上記と全く同様である。

【0034】

【発明の効果】請求項1記載の発明によれば、印加電圧の異なる複数の定着ヒータを用意し、画像形成装置の各状態に応じて点灯する定着ヒータを使い分けることで、突入電流を抑え、電圧変動規格を満足することができる。

【0035】請求項2記載の発明によれば、印加電圧の低い定着ヒータ点灯時の電流変動を極力減らすことで、電圧変動規格を満足することができる。

【0036】請求項3記載の発明によれば、待機時における装置全体に流れる電流を減少させると共に、これにより電圧変動規格を満足することができる。

【0037】請求項4記載の発明によれば、印加電圧の低い定着ヒータにより一旦定着ユニットを暖めてから電流容量の大きい定着ヒータを点灯するので、印加電圧の高い定着ヒータの突入電流を抑えることができると共に、定着ヒータが2本同時に点灯しないようにもしているため、トータル電流をも抑えることができ、またこれにより電圧変動規格を満足することができる。

【0038】請求項5記載の発明によれば、2本の定着ヒータが同時にオンすることを防ぐと共に、2本の定着ヒータの突入電流が重ならないようにすることで、機械の電流変動を減らして電圧変動規格を満足することができる。

【0039】請求項6記載の発明によれば、2本の定着ヒータが必ずずれたタイミングで点灯制御されるので、突入電流が重なることを防ぐと共に、機械の電圧変動をも減らし、これにより電圧変動規格を満足でき、また電源周期に対応して制御を行うため、制御が簡単に行えるようにすることができる。

【0040】請求項7記載の発明によれば、先に印加電圧の低い定着ヒータを点灯スタートすることで、突入電流が印加電圧の高い定着ヒータよりも低く抑えることができ(定着ヒータ容量は印加電圧の低い方が小さい)、これにより定着ヒータ点灯時の電流変動を極力抑えられるので、電圧変動規格を満足することができる。

【0041】請求項8記載の発明によれば、露光光源の突入電流を抑えることができる。

【図面の簡単な説明】

【図1】本発明の一実施の形態を示す定着ヒータ制御装置のブロック図である。

【図2】定着ヒータの点灯制御タイミングの第1の例を示すタイミング図である。

【図3】本発明の一実施の形態に係る定着ヒータ制御動作のフロー図である。

【図4】定着ヒータの点灯制御タイミングの第2の例を

示すタイミング図である。

【符号の説明】

- 1 商用交流電源
- 2 メインスイッチ
- 3 PSU

* 4 メイン制御基板

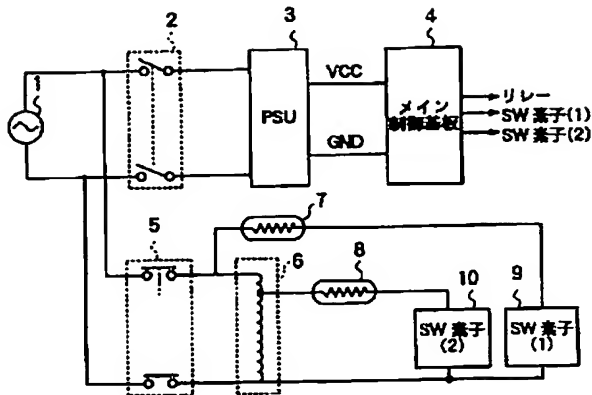
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6 トランス

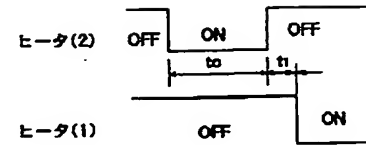
7, 8 定着ヒータ

* 9, 10 SW素子

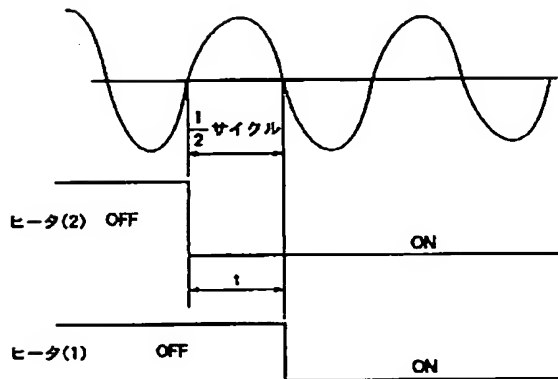
【図1】



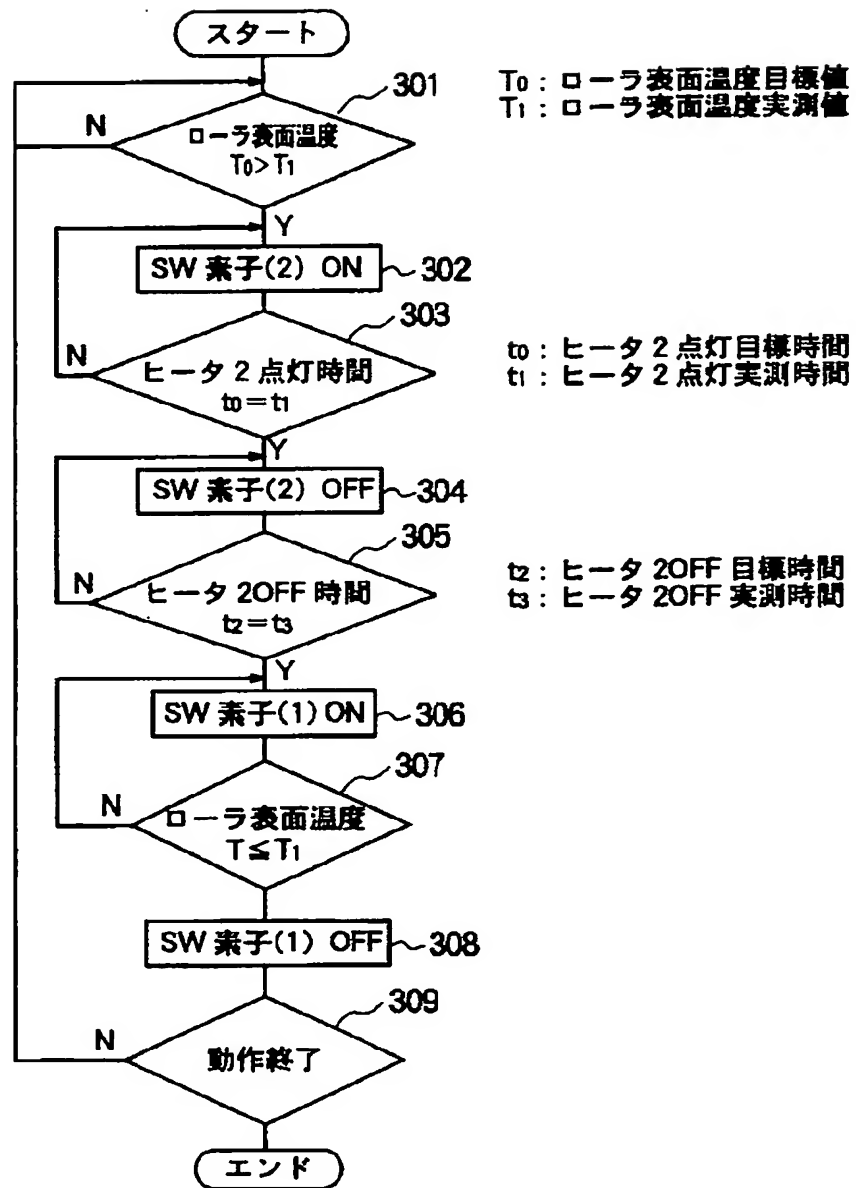
【図2】



【図4】



【図 3】



PATENT ABSTRACTS OF JAPAN

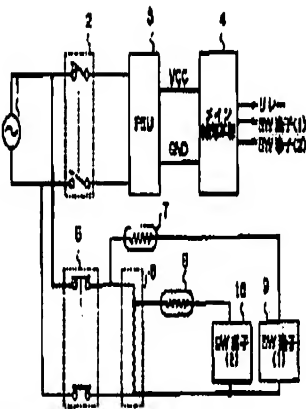
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(21)Application number : 08-080578 (71)Applicant : RICOH CO LTD
(22)Date of filing : 09.03.1996 (72)Inventor : INOUE GIICHI

(54) FIXING HEATER AND EXPOSURE LIGHT SOURCE CONTROLLER

(57)Abstract:
PROBLEM TO BE SOLVED: To suppress a rush current to the absolute minimum and to satisfy voltage fluctuation standards by constituting plural fixing heaters of fixing heaters different with each other in an applied voltage.
SOLUTION: When a main switch 2 is turned on, a power source unit(PSU) 3 is started to supply DC power to a main control substrate 4. When the power is supplied to this main control substrate 4, programs, etc., in a CPU and a RAM in the main control substrate 4 are started. When the programs are started, first a relay 5 is turned on and then, an SW element (1) 9 and an SW element (2) 10 are



turned on to light the fixing heaters 7 and 8 respectively. It is constituted so that voltages applied to the fixing heaters 7 and 8 are different with each other. Therefore, the fixing heaters 7 and 8 are selectively used in accordance with each state of an image forming device, so that the rush current is suppressed and the voltage fluctuation standards can be satisfied.

LEGAL STATUS

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[Patent number]
[Date of registration]
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CLAIMS

[Claim(s)]

[Claim 1] Said two or more fixing heaters are fixing heater control units characterized by being two or more fixing heaters with which a commercial alternating current electrical potential difference is impressed from a commercial alternating current power source, a transformer for dropping the impressed commercial alternating current electrical potential difference, and the fixing heater with which applied voltage differs a fixing heater in fixing heater control units, such as a copying machine with ON and the control means which carries out off control.

[Claim 2] The capacity of the fixing heater with which said applied voltage differs is a fixing heater control unit according to claim 1 characterized by the fixing heater with low applied voltage being smaller than a fixing heater with high applied voltage.

[Claim 3] It is the fixing heater control unit according to claim 2 which carries out lighting control with a fixing heater with low applied voltage at the time of machine standby, and is characterized by carrying out lighting control of the time of machine operation with a fixing heater with high applied voltage.

[Claim 4] It is the fixing heater control unit according to claim 3 characterized by the fixing heater with low applied voltage starting lighting control of a fixing heater with high applied voltage to exchange since fixed time amount lighting of the fixing heater with low applied voltage is previously carried out when turning on a fixing heater with high applied voltage at the time of machine operation.

[Claim 5] It is the fixing heater control unit according to claim 2 characterized by controlling to shift lighting start timing when turning on both a fixing heater with high applied voltage, and a fixing heater with low applied voltage.

[Claim 6] The fixing heater control unit according to claim 5 characterized by

shifting the lighting signal of a fixing heater with high applied voltage, and a fixing heater with low applied voltage more than the 1-/two cycle of a powerline period, and controlling it in order to control to shift the lighting start timing of two fixing heaters.

[Claim 7] The fixing heater control unit according to claim 6 characterized by the fixing heater which carries out a lighting start previously being a fixing heater with low applied voltage.

[Claim 8] Said two or more exposure light sources are exposure light source control units characterized by being two or more exposure light sources to which a commercial alternating current electrical potential difference is impressed from a commercial alternating current power source, a transformer for dropping the impressed commercial alternating current electrical potential difference, and the exposure light source in which applied voltage differs the exposure light source in exposure light source control units, such as a copying machine with ON and the control means which carries out off control.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fixing heater and exposure light source control unit of image formation equipment.

[0002]

[Description of the Prior Art] In recent years, in Europe, specification, such as voltage variation and a higher harmonic, is being enacted with CE mark. It was difficult to be satisfied with alternating voltage of the above-mentioned voltage variation specification like the halogen lamp for fixing, or the halogen lamp for exposure, with conventional image formation equipment, since it is with the time of ON of a halogen lamp, and OFF and the current variation of the whole image formation equipment becomes large to the large halogen lamp of the wattage which is carrying out lighting control.

[0003] Moreover, with conventional image formation equipment, since the 10 to 15 times as much rush current as the rated current of a halogen lamp flowed at the moment of impressing an electrical potential difference, in order to suppress this rush current, the halogen lamp carried out the soft start which performs a certain fixed time phase control from halogen lamp-on (for example, JP,5-224559,A), carried out preliminary lighting on the electrical potential difference smaller than the rated voltage of a halogen lamp (for example, JP,6-110565,A), and was coping with inserting current-limiting resistance etc.

[0004]

[Problem(s) to be Solved by the Invention] However, there were the following faults as the above-mentioned cure.

- (1) If phase control like a soft start is performed, a higher-harmonic noise will occur.
- (2) If a halogen lamp is turned on on an electrical potential difference smaller than rated voltage, the filament temperature (color temperature) of a halogen

lamp becomes low, and it becomes halogen gas of deep concentration relatively, and a filament will be corroded and the life of a halogen lamp will become short.

(3) Even if it inserts current-limiting resistance and suppresses the rush current to about 5 to 10 times, there is no effectiveness that voltage variation specification can be satisfied.

[0005] This invention solves the fault of the above-mentioned conventional technique, suppresses the rush current to necessary minimum, and aims at offering the fixing heater and exposure light source control unit with which it can be satisfied of voltage variation specification by this.

[0006]

[Means for Solving the Problem] In order to attain this purpose, it is characterized by being a transformer for dropping the commercial alternating current electrical potential difference to which the 1st means was impressed with two or more fixing heaters with which a commercial alternating current electrical potential difference is impressed from a commercial alternating current power source, and the fixing heater with which two or more fixing heaters differ a fixing heater in applied voltage in fixing heater control units, such as a copying machine with ON and the control means which carries out off control.

[0007] Moreover, capacity of the fixing heater with which the 2nd means differ in applied voltage in the 1st means is characterized by the fixing heater with applied voltage lower than a fixing heater with high applied voltage being smaller.

[0008] Moreover, it is characterized by for the 3rd means carrying out lighting control with a fixing heater with low applied voltage in the 2nd means at the time of machine standby, and carrying out lighting control of the time of machine operation with a fixing heater with high applied voltage.

[0009] Moreover, since the 4th means carries out fixed time amount lighting of the fixing heater with low applied voltage previously in the 3rd means when turning on a fixing heater with high applied voltage at the time of machine operation, the fixing heater with low applied voltage is characterized by starting lighting control of a fixing heater with high applied voltage to exchange.

[0010] Moreover, in the 2nd means, the 5th means is characterized by controlling to shift lighting start timing, when turning on both a fixing heater with high applied voltage, and a fixing heater with low applied voltage.

[0011] Moreover, in the 5th means, the 6th means is characterized by shifting the lighting signal of a fixing heater with high applied voltage, and a fixing heater with low applied voltage more than the 1-/two cycle of a powerline period, and controlling it, in order to control to shift the lighting start timing of two fixing heaters.

[0012] Moreover, the 7th means is characterized by the fixing heater which carries out a lighting start previously being a fixing heater with low applied voltage in the 6th means.

[0013] Moreover, it is characterized by the transformer for dropping the commercial alternating current electrical potential difference to which the 8th means was impressed with two or more exposure light sources to which a commercial alternating current electrical potential difference is impressed from a commercial alternating current power source, and being the exposure light source from which two or more exposure light sources differ the exposure light source in applied voltage in exposure light source control units, such as a copying machine with ON and the control means which carries out off control.

[0014]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to an accompanying drawing. Drawing 1 is the block diagram of the fixing heater control device in which the gestalt of 1 operation of this invention is shown. It connects with the commercial alternating current power source 1, this equipment connects fixing heater (1) 7 of a main switch 2, PSU (power-source unit) 3, the Maine control board 4, relay 5, and 6 or 2 transformers, (2) 8, SW component (1) 9, and (2) 10, as shown in drawing, and it is constituted.

[0015] In such a configuration, if a main switch 2 is turned on, PSU 3 will start and a DC power supply will be supplied to the Maine control board 4. If a power source is supplied to the Maine control board 4, the program in CPU in a substrate 4 and RAM etc. will start. If a program starts, relay 5 will be turned on first, subsequently SW component (1) 9 and SW component (2) 10 will be turned on, and fixing heater (1) 7 and fixing heater (2) 8 will light up, respectively.

[0016] Here, although they can consider a semi-conductor, a relay, etc., the SW components 9 and 10 are good anything, if ON and OFF can be performed. Moreover, the electrical potential difference of the commercial alternating current power source 1 is impressed directly, and to fixing heater (2) 8, the electrical potential difference of the commercial alternating current power source 1 lets a transformer 6 pass, and it is constituted fixing heater (1) 7 so that it may be descended and impressed by a certain electrical potential difference. Fixing heaters 7 and 8 detect fixing roller skin temperature by temperature detector elements, such as a thermistor, and are controlling to be able to keep fixing temperature constant.

[0017] It is the electrical potential difference built over V_0 and fixing heater (2) 8 in the electrical potential difference which sets to E the electrical potential difference supplied from the commercial alternating current power source 1 here, and is actually built over fixing heater (1) 7 V_1 It is V_0 when it

carries out. V_1 Relation is $V_0 > V_1$. Becoming, the relation of the rush current of each fixing heaters 7 and 8 at this time is $I_P 0 > I_P 1$. It becomes.

[0018] Therefore, a part for the voltage variation at the time of each fixing heater lighting of the electrical potential difference E supplied from the commercial alternating current power source 1 is $E_0 > E_1$. It becomes and, as for voltage variation, the direction at the time of lighting of fixing heater (2) 8 becomes small. Thus, the rush current can be suppressed by lowering the electrical potential difference concerning fixing heaters 7 and 8, and, thereby, voltage variation can be stopped now.

[0019] Moreover, above, although the number of fixing heaters is two, constitute the output of a transformer 6 in plurality and it has a fixing heater an outputted part of a transformer 6, and finer control is attained.

[0020] above-mentioned drawing 1 explained by invention according to claim 1 — as — fixing heater (1) 7 and a fixing heater (2) — [fixing heater (1) > fixing heater (2 from which the electrical potential difference impressed to 8 differs —) —] — it constitutes like. For this reason, it can control now by using the fixing heater to turn on properly according to each condition of a machine to suppress the current which flows to the whole machine as much as possible.

[0021] It constitutes and the relation of the capacity (wattage) of fixing heater (1) 7 and fixing heater (2) 8 consists of invention according to claim 2 like a fixing heater (1) > fixing heater (2) so that the electrical potential differences impressed to fixing heater (1) 7 and fixing heater (2) 8 may differ. For this reason, the direction at the time of lighting of fixing heater (2) 8 can reduce current variation now from fixing heater (1) 7.

[0022] Since it constitutes from invention according to claim 3 so that fixing heater (1) 7 of the monograph affair in which it explained above, and fixing heater (2) 8 may carry out lighting control only by fixing heater (2) 8 at the time of machine standby and lighting control of the time of machine operation may be carried out only by fixing heater (1) 7, the current variation at the time of machine standby can be stopped.

[0023] At the time of standby, since the heat of a heater is not taken by the transfer paper compared with the time of actuation, it can be managed with the heater of small capacity. Moreover, in order to stop voltage variation as much as possible, it is required to suppress change of a condition so that it may continue turning on fixing heaters 7 and 8 or may continue erasing, and for this reason, it constitutes from this invention so that it may control to make the light switch on for a long time with the fixing heaters 7 and 8 of small capacity.

[0024] In invention according to claim 4, the lighting control timing of fixing heater (1) 7 at the time of machine operation and fixing heater (2) 8 When it is timing as shown in drawing 2 and fixing heater (1) 7 are made to turn on, it

is surely fixing heater (2) 8 to Time amount lighting is carried out. Fixing heater (1) After warming 7, fixing heater (2) 8 are turned off, and it is t1. It is controlling to set time and to turn on fixing heater (1) 7.

[0025] Here, it is t0. Fixing heater (1) The impedance of 7 is Z0. It is time amount until it is set to [omega], and changes with heater rated voltage and rated capacity. Moreover, it is the impedance of fixing heater (1) 7 Z0 It is for preventing the rush current at the time of ON of fixing heater (1) 7 to make the light switch on, since [omega] is raised.

[0026] Moreover, it is t1 between ON of fixing heater (1) 7 from OFF of fixing heater (2) 8. It ends that fixing heater (1) 7 and fixing heater (2) 8 light up to coincidence time, and it is for avoiding that the current of fixing heater 2 duty flows to a machine, and current variation becomes large.

[0027] When the above-mentioned contents are explained based on the flow chart of drawing 3, it is not rich and judges [in which a machine carries out initiation of operation] whether fixing roller skin temperature is setting desired value (step 301), and in below desired value, SW component (2) 10 are turned on, and fixing heater (2) 8 are made to turn on (step 302). And the time amount which is making fixing heater (2) 8 turn on is t0. It judges whether it became or not (step 303) and is t0. When not becoming, turning on SW component (2) 10 is continued, and it is t0. When it becomes, SW component (2) 10 are turned off (step 304).

[0028] Subsequently, it is t2 after turning off SW component (2) 10. It judges whether time amount progress was carried out (step 305), and is t2. When time amount progress is carried out, SW component (1) 9 are turned on, and fixing heater (1) 7 are made to turn on (step 306). Here, it judges whether fixing roller skin temperature turned into target temperature during lighting of fixing heater (1) 7 (step 307), when not becoming target temperature, SW component (1) 9 are turned on continuously, and when it becomes target temperature, SW component (1) 9 are turned off (step 308).

[0029] Subsequently, it judges whether actuation of a machine was completed (step 309), and, in termination of operation, a standby condition is controlled. When machine operation is still being performed, return is performed to step 301, and it controls to this appearance.

[0030] When it seems that coincidence is made to turn on fixing heater (1) 7 and fixing heater (2) 8, it is timing as shown in drawing 4, and t hours after turning on fixing heater (2) 8, it is controlling by invention according to claim 5 to 7 to make fixing heater (1) 7 turn on.

[0031] t is time amount for the rush current at the time of lighting initiation of fixing heater (1) 7 not to lap with fixing heater (2) 8, and he is trying to control this time amount by invention according to claim 6 to the 1-/two cycle of a source-power-supply period here. Moreover, since fixing heater (1) 7 are warmed by making this time amount turn on fixing heater (2) 8

previously, it also becomes possible to suppress the rush current of fixing heater (1) 7 the very thing.

[0032] Here, like invention according to claim 7, making fixing heater (2) 8 turn on previously has low applied voltage compared with fixing heater (1) 7, and since heating capacity is also made to constitute small, it is for suppressing small the rush current at the time of lighting initiation.

[0033] As mentioned above, although the gestalt of operation of this invention mentioned the fixing heater as the example and explained it as a power-source load, also in an exposure lamp, it is completely the same as that of the above.

[0034]

[Effect of the Invention] According to invention according to claim 1, two or more fixing heaters with which applied voltage differs are prepared, and the rush current can be suppressed and it can be satisfied with using properly the fixing heater turned on according to each condition of image formation equipment of voltage variation specification.

[0035] According to invention according to claim 2, it can be satisfied with reducing the current variation at the time of fixing heater lighting with low applied voltage as much as possible of voltage variation specification.

[0036] While decreasing the current which flows to the whole equipment at the time of standby according to invention according to claim 3, thereby, voltage variation specification can be satisfied.

[0037] Since he is also trying for a fixing heater not to light up to 2 coincidence since according to invention according to claim 4 a fixing heater with large current capacity is turned on once it warms a fixing unit with a fixing heater with low applied voltage while being able to suppress the rush current of a fixing heater with high applied voltage, a total current can also be suppressed and, thereby, voltage variation specification can be satisfied.

[0038] While preventing two fixing heaters turning on in coincidence according to invention according to claim 5, the current variation of a machine can be reduced and it can be satisfied with making it the rush current of two fixing heaters not lap of voltage variation specification.

[0039] Since the voltage variation of a machine is also reduced, and voltage variation specification can be satisfied by this and it controls corresponding to a powerline period while preventing the rush current lapping, since lighting control of the two fixing heaters is carried out to the timing surely shifted according to invention according to claim 6, it can make it possible to control simply.

[0040] According to invention according to claim 7, since the rush current can stop lower than a fixing heater with high applied voltage (fixing heater capacity has the small one where applied voltage is lower) and can stop the current variation at the time of fixing heater lighting as much as possible by

this, it can be satisfied with carrying out the lighting start of the fixing heater with low applied voltage previously of voltage variation specification.

[0041] According to invention according to claim 8, the rush current of the exposure light source can be suppressed.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the fixing heater and exposure light source control unit of image formation equipment.

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PRIOR ART

[Description of the Prior Art] In recent years, in Europe, specification, such as voltage variation and a higher harmonic, is being enacted with CE mark. It was difficult to be satisfied with alternating voltage of the above-mentioned voltage variation specification like the halogen lamp for fixing, or the halogen lamp for exposure, with conventional image formation equipment, since it is with the time of ON of a halogen lamp, and OFF and the current variation of the whole image formation equipment becomes large to the large halogen lamp of the wattage which is carrying out lighting control.

[0003] Moreover, with conventional image formation equipment, since the 10 to 15 times as much rush current as the rated current of a halogen lamp flowed at the moment of impressing an electrical potential difference, in order to suppress this rush current, the halogen lamp carried out the soft start which performs a certain fixed time phase control from halogen lamp-on (for example, JP,5-224559,A), carried out preliminary lighting on the electrical potential difference smaller than the rated voltage of a halogen lamp (for example, JP,6-110565,A), and was coping with inserting current-limiting resistance etc.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to invention according to claim 1, two or more fixing heaters with which applied voltage differs are prepared, and the rush current can be suppressed and it can be satisfied with using properly the fixing heater turned on according to each condition of image formation equipment of voltage variation specification.

[0035] According to invention according to claim 2, it can be satisfied with reducing the current variation at the time of fixing heater lighting with low applied voltage as much as possible of voltage variation specification.

[0036] While decreasing the current which flows to the whole equipment at the time of standby according to invention according to claim 3, thereby, voltage variation specification can be satisfied.

[0037] Since he is also trying for a fixing heater not to light up to 2 coincidence since according to invention according to claim 4 a fixing heater with large current capacity is turned on once it warms a fixing unit with a fixing heater with low applied voltage while being able to suppress the rush current of a fixing heater with high applied voltage, a total current can also be suppressed and, thereby, voltage variation specification can be satisfied.

[0038] While preventing two fixing heaters turning on in coincidence according to invention according to claim 5, the current variation of a machine can be reduced and it can be satisfied with making it the rush current of two fixing heaters not lap of voltage variation specification.

[0039] Since the voltage variation of a machine is also reduced, and voltage variation specification can be satisfied by this and it controls corresponding to a powerline period while preventing the rush current lapping, since lighting control of the two fixing heaters is carried out to the timing surely shifted according to invention according to claim 6, it can make it possible to control simply.

[0040] According to invention according to claim 7, since the rush current can stop lower than a fixing heater with high applied voltage (fixing heater

capacity has the small one where applied voltage is lower) and can stop the current variation at the time of fixing heater lighting as much as possible by this, it can be satisfied with carrying out the lighting start of the fixing heater with low applied voltage previously of voltage variation specification.

[0041] According to invention according to claim 8, the rush current of the exposure light source can be suppressed.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, there were the following faults as the above-mentioned cure.

- (1) If phase control like a soft start is performed, a higher-harmonic noise will occur.
- (2) If a halogen lamp is turned on on an electrical potential difference smaller than rated voltage, the filament temperature (color temperature) of a halogen lamp becomes low, and it becomes halogen gas of deep concentration relatively, and a filament will be corroded and the life of a halogen lamp will become short.
- (3) Even if it inserts current-limiting resistance and suppresses the rush current to about 5 to 10 times, there is no effectiveness that voltage variation specification can be satisfied.

[0005] This invention solves the fault of the above-mentioned conventional technique, suppresses the rush current to necessary minimum, and aims at offering the fixing heater and exposure light source control unit with which it can be satisfied of voltage variation specification by this.

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MEANS

[Means for Solving the Problem] In order to attain this purpose, it is characterized by being a transformer for dropping the commercial alternating current electrical potential difference to which the 1st means was impressed with two or more fixing heaters with which a commercial alternating current electrical potential difference is impressed from a commercial alternating current power source, and the fixing heater with which two or more fixing heaters differ a fixing heater in applied voltage in fixing heater control units, such as a copying machine with ON and the control means which carries out off control.

[0007] Moreover, capacity of the fixing heater with which the 2nd means differ in applied voltage in the 1st means is characterized by the fixing heater with applied voltage lower than a fixing heater with high applied voltage being smaller.

[0008] Moreover, it is characterized by for the 3rd means carrying out lighting control with a fixing heater with low applied voltage in the 2nd means at the time of machine standby, and carrying out lighting control of the time of machine operation with a fixing heater with high applied voltage.

[0009] Moreover, since the 4th means carries out fixed time amount lighting of the fixing heater with low applied voltage previously in the 3rd means when turning on a fixing heater with high applied voltage at the time of machine operation, the fixing heater with low applied voltage is characterized by starting lighting control of a fixing heater with high applied voltage to exchange.

[0010] Moreover, in the 2nd means, the 5th means is characterized by controlling to shift lighting start timing, when turning on both a fixing heater with high applied voltage, and a fixing heater with low applied voltage.

[0011] Moreover, in the 5th means, the 6th means is characterized by shifting the lighting signal of a fixing heater with high applied voltage, and a fixing heater with low applied voltage more than the 1-/two cycle of a

powerline period, and controlling it, in order to control to shift the lighting start timing of two fixing heaters.

[0012] Moreover, the 7th means is characterized by the fixing heater which carries out a lighting start previously being a fixing heater with low applied voltage in the 6th means.

[0013] Moreover, it is characterized by the transformer for dropping the commercial alternating current electrical potential difference to which the 8th means was impressed with two or more exposure light sources to which a commercial alternating current electrical potential difference is impressed from a commercial alternating current power source, and being the exposure light source from which two or more exposure light sources differ the exposure light source in applied voltage in exposure light source control units, such as a copying machine with ON and the control means which carries out off control.

[0014]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to an accompanying drawing. Drawing 1 is the block diagram of the fixing heater control device in which the gestalt of 1 operation of this invention is shown. It connects with the commercial alternating current power source 1, this equipment connects fixing heater (1) 7 of a main switch 2, PSU (power-source unit) 3, the Maine control board 4, relay 5, and 6 or 2 transformers, (2) 8, SW component (1) 9, and (2) 10, as shown in drawing, and it is constituted.

[0015] In such a configuration, if a main switch 2 is turned on, PSU3 will start and a DC power supply will be supplied to the Maine control board 4. If a power source is supplied to the Maine control board 4, the program in CPU in a substrate 4 and RAM etc. will start. If a program starts, relay 5 will be turned on first, subsequently SW component (1) 9 and SW component (2) 10 will be turned on, and fixing heater (1) 7 and fixing heater (2) 8 will light up, respectively.

[0016] Here, although they can consider a semi-conductor, a relay, etc., the SW components 9 and 10 are good anything, if ON and OFF can be performed. Moreover, the electrical potential difference of the commercial alternating current power source 1 is impressed directly, and to fixing heater (2) 8, the electrical potential difference of the commercial alternating current power source 1 lets a transformer 6 pass, and it is constituted fixing heater (1) 7 so that it may be descended and impressed by a certain electrical potential difference. Fixing heaters 7 and 8 detect fixing roller skin temperature by temperature detector elements, such as a thermistor, and are controlling to be able to keep fixing temperature constant.

[0017] It is the electrical potential difference built over V0 and fixing heater (2) 8 in the electrical potential difference which sets to E the electrical

potential difference supplied from the commercial alternating current power source 1 here, and is actually built over fixing heater (1) 7 V1. It is V0 when it carries out. V1 Relation is $V0 > V1$. Becoming, the relation of the rush current of each fixing heaters 7 and 8 at this time is $IP0 > IP1$. It becomes.

[0018] Therefore, a part for the voltage variation at the time of each fixing heater lighting of the electrical potential difference E supplied from the commercial alternating current power source 1 is $E0 > E1$. It becomes and, as for voltage variation, the direction at the time of lighting of fixing heater (2) 8 becomes small. Thus, the rush current can be suppressed by lowering the electrical potential difference concerning fixing heaters 7 and 8, and, thereby, voltage variation can be stopped now.

[0019] Moreover, above, although the number of fixing heaters is two, constitute the output of a transformer 6 in plurality and it has a fixing heater an outputted part of a transformer 6, and finer control is attained.

[0020] above-mentioned drawing 1 explained by invention according to claim 1 -- as -- fixing heater (1) 7 and a fixing heater (2) -- [fixing heater (1) > fixing heater (2) from which the electrical potential difference impressed to 8 differs --] -- it constitutes like. For this reason, it can control now by using the fixing heater to turn on properly according to each condition of a machine to suppress the current which flows to the whole machine as much as possible.

[0021] It constitutes and the relation of the capacity (wattage) of fixing heater (1) 7 and fixing heater (2) 8 consists of invention according to claim 2 like a fixing heater (1) > fixing heater (2) so that the electrical potential differences impressed to fixing heater (1) 7 and fixing heater (2) 8 may differ. For this reason, the direction at the time of lighting of fixing heater (2) 8 can reduce current variation now from fixing heater (1) 7.

[0022] Since it constitutes from invention according to claim 3 so that fixing heater (1) 7 of the monograph affair in which it explained above, and fixing heater (2) 8 may carry out lighting control only by fixing heater (2) 8 at the time of machine standby and lighting control of the time of machine operation may be carried out only by fixing heater (1) 7, the current variation at the time of machine standby can be stopped.

[0023] At the time of standby, since the heat of a heater is not taken by the transfer paper compared with the time of actuation, it can be managed with the heater of small capacity. Moreover, in order to stop voltage variation as much as possible, it is required to suppress change of a condition so that it may continue turning on fixing heaters 7 and 8 or may continue erasing, and for this reason, it constitutes from this invention so that it may control to make the light switch on for a long time with the fixing heaters 7 and 8 of small capacity.

[0024] In invention according to claim 4, the lighting control timing of fixing

heater (1) 7 at the time of machine operation and fixing heater (2) 8 When it is timing as shown in drawing 2 and fixing heater (1) 7 are made to turn on, it is surely fixing heater (2) 8 t0 Time amount lighting is carried out. Fixing heater (1) After warming 7, fixing heater (2) 8 are turned off, and it is t1. It is controlling to set time and to turn on fixing heater (1) 7.

[0025] Here, it is t0. Fixing heater (1) The impedance of 7 is Z0. It is time amount until it is set to [omega], and changes with heater rated voltage and rated capacity. Moreover, it is the impedance of fixing heater (1) 7 Z0 It is for preventing the rush current at the time of ON of fixing heater (1) 7 to make the light switch on, since [omega] is raised.

[0026] Moreover, it is t1 between ON of fixing heater (1) 7 from OFF of fixing heater (2) 8. It ends that fixing heater (1) 7 and fixing heater (2) 8 light up to coincidence time, and it is for avoiding that the current of fixing heater 2 duty flows to a machine, and current variation becomes large.

[0027] When the above-mentioned contents are explained based on the flow chart of drawing 3, it is not rich and judges [in which a machine carries out initiation of operation] whether fixing roller skin temperature is setting desired value (step 301), and in below desired value, SW component (2) 10 are turned on, and fixing heater (2) 8 are made to turn on (step 302). And the time amount which is making fixing heater (2) 8 turn on is t0. It judges whether it became or not (step 303) and is t0. When not becoming, turning on SW component (2) 10 is continued, and it is t0. When it becomes, SW component (2) 10 are turned off (step 304).

[0028] Subsequently, it is t2 after turning off SW component (2) 10. It judges whether time amount progress was carried out (step 305), and is t2. When time amount progress is carried out, SW component (1) 9 are turned on, and fixing heater (1) 7 are made to turn on (step 306). Here, it judges whether fixing roller skin temperature turned into target temperature during lighting of fixing heater (1) 7 (step 307), when not becoming target temperature, SW component (1) 9 are turned on continuously, and when it becomes target temperature, SW component (1) 9 are turned off (step 308).

[0029] Subsequently, it judges whether actuation of a machine was completed (step 309), and, in termination of operation, a standby condition is controlled. When machine operation is still being performed, return is performed to step 301, and it controls to this appearance.

[0030] When it seems that coincidence is made to turn on fixing heater (1) 7 and fixing heater (2) 8, it is timing as shown in drawing 4, and t hours after turning on fixing heater (2) 8, it is controlling by invention according to claim 5 to 7 to make fixing heater (1) 7 turn on.

[0031] t is time amount for the rush current at the time of lighting initiation of fixing heater (1) 7 not to lap with fixing heater (2) 8, and he is trying to control this time amount by invention according to claim 6 to the 1-2/20

cycle of a source-power-supply period here. Moreover, since fixing heater (1) 7 are warmed by making this time amount turn on fixing heater (2) 8 previously, it also becomes possible to suppress the rush current of fixing heater (1) 7 the very thing.

[0032] Here, like invention according to claim 7, making fixing heater (2) 8 turn on previously has low applied voltage compared with fixing heater (1) 7, and since heating capacity is also made to constitute small, it is for suppressing small the rush current at the time of lighting initiation.

[0033] As mentioned above, although the gestalt of operation of this invention mentioned the fixing heater as the example and explained it as a power-source load, also in an exposure lamp, it is completely the same as that of the above.

[Translation done.]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.*** shows the word which can not be translated.

3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram of the fixing heater control device in which the gestalt of 1 operation of this invention is shown.

[Drawing 2] It is the timing chart showing the 1st example of the lighting control timing of a fixing heater.

[Drawing 3] It is the flow Fig. of the fixing heater control action concerning the gestalt of 1 operation of this invention.

[Drawing 4] It is the timing chart showing the 2nd example of the lighting control timing of a fixing heater.

[Description of Notations]

1 Commercial Alternating Current Power Source

2 Main Switch

3 PSU

4 Maine Control Board

5 Relay

6 Transformer

7 Eight Fixing heater

9 Ten SW component

[Translation done.]